Amendment Dated November 28, 2007
Serial No. 10/718,129

REMARKS

Reconsideration of the rejections set forth in the Office Action is respectfully requested. By this amendment, claims 11-14 and 23 have been canceled without prejudice or disclaimer, and claims 1-2, 5, 9-10, 15, and 17 have been amended. Currently, claims 1-10 and 15-22 are pending in this application.

Objection to the specification

The Examiner objected to the specification because Paragraph 51 referenced LRS as being shown in Fig. 6. Applicants have amended Par. 51 as shown below, with strikeout being used to show deleted text and underlining being used to show inserted text. The Examiner is requested to approve this amendment to the specification when acting on this Amendment.

[0051] Local MAC addresses may be assigned manually~~, for example as was done in connection with Fig. 4 and as described above~~. However, with a large network with hundreds of switches and tens or hundreds of thousands of end devices, this may not be practical. ~~Figs. 5 and 6 collectively illustrate and describe a manner in which~~ Thus, local MAC addresses may be assigned on a local domain automatically, for example by a Location Resolution Server (LRS) 18 (see Fig. 4 ~~Figs. 4 and 6.~~). While the functions of the LRS 18 will be described in connection with assigning LMAs on the network, the functionality of the LRS is not limited to this aspect of interaction on the network, as the LRS may also be used to perform other services, such as resolving addresses on the network.

Rejection under 35 USC 101

Claims 10-14 were rejected under 35 USC 101 as being directed to non-statutory subject matter. Specifically, the Examiner has taken the position that a protocol data unit is a data structure, which the Examiner contends is an abstract idea and a mere arrangement of data. As support for this position the Examiner has cited MPEP 2106.01. Applicants have amended claim 10 to recite a "protocol data unit data structure stored in a tangible computer readable medium, the protocol data unit data structure comprising…".

As set forth in MPEP 2106.01, when functional descriptive material such as a data structure is recorded on some computer-readable medium, it becomes structurally and

functionally interrelated to the medium and will be statutory in most cases since use of technology permits the function of the descriptive material to be realized. In view of the amendments to the claims, applicants respectfully request that the rejection under 35 USC 101 be withdrawn.

Rejection under 35 USC 102 and 35 USC 103

All pending claims in this application were rejected under 35 USC 102, or under 35 USC 103. Applicants have amended the claims to overcome these rejections. Accordingly, in view of the claim amendments, these rejections are believed to be moot. However, to expedite prosecution, applicants will provide an explanation as to how the amended claims overcome several of the pieces of cited art more heavily relied on by the Examiner in the Office Action.

This application relates to a way to allow a switch to directly identify the output port for a given frame without performing a table access operation. (Specification at Paragraph 18). Specifically, applicants discovered that it would be advantageous to provide a frame with frame contained destination information that would allow one or more switches on the network to receive the frame, look at the destination information, and output the frame on a correct port to that destination without requiring the switch to perform a table lookup.

Claims 1, 3, 5-6, 10, and 12 as originally presented were rejected under 35 USC 102 as anticipated by Schaub (U.S. Patent No. 7,190,695). Schaub does not teach or suggest a switch that can receive the frame, look at the destination information, and output the frame on a correct port to that destination without requiring the switch to perform a table lookup.

Fig. 3 of Schaub shows the internal structure of a switch/router 300 (Schaub at Col. 5, lines 4-5). As shown in Fig. 3, the switch/router has a 10GB Ethernet physical layer unit (PHY) 310 that will allow it to connect to a 10GB Ethernet data link. To avoid using specialized 10 Gbs layer 2 and 3 processors (Schaub at Col. 6, lines 8-10), Schaub teaches that it would be preferable to use 10 x 1 Gbs processors. (Col. 5, lines 63-Col. 6, line 12). This allows readily available 1 Gbs subsystems to be used to process the incoming packets.

Schaub realized that splitting the incoming 10Gbs stream could be analogized to distributing packets between parallel links in a link aggregation system. Specifically, at Col. 1, lines 62-63, Schaub teaches that link aggregation is commonly used to connect two network

nodes with multiple physical links. Schaub continues at Col. 2, lines 1-6, to explain that the link aggregation involves a distribution function that receives packets from a higher rate link and distributes the packets amongst the lower rate links.

Schaub then borrows this distribution concept from link aggregation, and implements it in the switch/router 300 as packet distributor 312. (Schaub at Col. 5, lines 37-41). Specifically, the packet distributor receives the packets from the 10Gbs link and distributes the packets to multiple internal 1 Gbs links 322. (Id. See also Schaub at col. 6, lines 13-17). The internal 1Gbs links extend from the 10Gbs PHY to the MAC/packet processors.

The particular way in which Schaub distributes the packets to the various MAC processors is not particularly important. Briefly, the packet distributer looks at various fields of the headers to determine the category type of the packet. Based on the category type of the packet a mapping function is selected, which is then used to cause the packet to be output on one of the lines 322 to the MAC processors. (See Schaub at Col. 3, lines 51-62; and Col. 6, lines 13-22).

The distributor 312 described above allows the packet to be received at the physical interface (PHY 310) and output to one of the internal 1 Gbs links 322. The links 322 carry the packet to one of 10 sets of parallel processors. Specifically, each link 322 is connected to a MAC processor that reads the layer 2 header of the incoming packets and performs a layer 2 lookup to determine how to forward the incoming packets to their next destination within the switch. (Schaub at Col. 5, lines 42-46). The packets are then conveyed to the packet processors 316 which performs a next hop (layer 3) address lookup for the routed packets (when necessary). (Schaub at Col. 5, lines 52-57).

Based on the layer 2 lookup performed by the MAC 314 or the layer 3 lookup performed by the packet processor 316, the packet will be input to the switch fabric 318 where the packet will be switched according to the result of the table lookup. (Schaub at Col. 5, lines 56-62).

Thus, Schaub uses standard forwarding table lookup operations to determine an output port for a particular packet. The forwarding table lookups are performed by the MAC 314 or the packet processor 316, or both. The packet distributor is used to select which of the several parallel sets of processors should be used to perform the lookup for that particular packet, but the result of the distributor does not in any way affect the ultimate selection of the output port 320 from the switch/router.

Manur teaches at col. 7, lines 6-9, that the processor 110A receives a packet and determines a destination address DA from the header of the received packet. Manur then states, that the destination address 112 is used as a basis to index into content addressable memory 120 to obtain the next hop egress port identification. (Col. 7, lines 1-18). Manur explaines in some detail how the content addressable memory may be used to determine the next hop egress port by indexing into various tables. (See e.g. Manur at Col. 7, lines 19-28; Col. 7, lines 37-49; Col. 8, lines 18-28)

In all of these instances, Manur refers to the process of "determining" the egress port and then describes that the process is accomplished by performing a lookup in one or more tables. Accordingly, the natural reading of step 238 would be that, if link aggregation was not required, the processor would use the destination address to "determine" the egress port by using the destination address to index into the CAM 120. Thus, applicants respectfully submit that the cited portions of Manur, when read in context, do not teach or suggest a method that will enable a frame to be forwarded to an output port based on frame contained destination information without performing a table lookup operation to determine the output port.

Claims 10 and 15

Independent claim 10 has been amended to recite that the protocol data unit has a destination Media Access Control (MAC) address, the destination MAC address being a local MAC address having a plurality of fields, each of the fields including a number of bits smaller than a total number of bits of the destination MAC address, and each of the fields containing a code to be used by a switch on a network to identify an output port on the switch without performing a table lookup operation, wherein each of the fields is to be used by a different switch on the network.

Independent claim 15 has been amended to recite a method of assigning a Media Access Control (MAC) address to an interface on a network, by assigning a first value to a first field of the MAC address, the first field containing a smaller number of bits than a total number of bits of the destination MAC address, said first value containing first output interface information usable by a first switch to identify a first output interface for transmission of frames containing the first value in the first field of said MAC address.

To distinguish what is being claimed in this application from the distribution function shown in Schaub, applicants have amended claim 1 to recite a method of switching frames that includes the steps of making a switching decision based on extracted frame contained destination information without performing a lookup in a forwarding table to determine an output port from the first switch over which the frame should be forwarded onto the communication network; forwarding the frame within the switch to the output port over which the frame should be forwarded onto the communication network; and transmitting the frame from the determined output port onto the communication network. Claim 1 has further been amended to recite that the method enables a received frame to be transmitted from an input port to a determined output port and then onto the communication network based on the frame contained destination information without performing a table lookup operation to determine the output port.

Schaub does not teach or suggest a method of this nature. Specifically, Schaub does not teach switching frames within a switch based on frame contained destination information to an output port from which the frame will be transmitted onto a communication network without performing a table lookup operation. Accordingly, applicants respectfully submit that claim 1, as amended, is patentable over Schaub.

Claim 2 was rejected under 35 USC 103 as unpatentable over Schaub in view of Manur (U.S. Patent No. 7,190,696). Specifically, the Examiner noted in connection with this rejection that Schaub does not teach reading a portion of a header of the frame and causing the frame to be passed directly to the output port. However, the Examiner has taken the position that Manur teaches this feature, citing Fig. 8, elements 230 and 238.

Manur relates to a system that is able to distribute packets across equal cost paths to a common destination, or between links that have been designated as belonging to a link aggregation group (Manur at Col. 1, lines 39-46). Fig. 8, cited by the Examiner, is described as showing a method of distributing packet flows across links associated with a given link-aggregation. If link aggregation is not enabled (230, 232, 236) Fig. 8 states that the process will "determine a next-hop egress port ID based upon the destination address." The text at col. 10, lines 29-34 state that the next-hop egress port is determined "directly" via the destination address. As far as applicants can tell, step 238 is not discussed elsewhere in Manur.

Applicants respectfully submit that these sections of Manur do not teach that the next hop egress port will be known from the destination address without a table lookup. Specifically,

These claims are patentable over the cited art because the cited art does not appear to teach or suggest using portions of a MAC address to switch traffic within a switch.

In connection with claim 15, the Examiner has taken the position that Pearce (U.S. Patent No. 6,556,574) teaches assigning values to fields of the MAC address, citing col. 20, lines 10-18 of Pearce. The cited portion of Pearce relates to Fig. 10, which Pearce describes as an "ARP table" (Pearce at Col. 19, lines 65-67). As described by Pearce, the ARP table allows the route information to be given as part of the layer 2 MAC address, and also allows a binding between the layer 2 MAC address and layer 3 IP address to be provided. This cited portion does not teach or suggest the use of sub-fields within the MAC address.

Conclusion

In view of the amendments to the claims and the foregoing remarks, it is respectfully submitted that the application is now in condition for allowance and an action to this effect is respectfully requested. If there are any questions or concerns regarding the amendments or these remarks, the Examiner is requested to telephone the undersigned at the telephone number listed below.

If any fees are due in connection with this filing, the Commissioner is hereby authorized to charge payment of the fees associated with this communication or credit any overpayment to Deposit Account No. 502246 (Ref: NN-14715).

Respectfully Submitted

John C. Gorecki
Registration No. 38,471

Dated: November 28, 2007

John C. Gorecki, Esq.
P.O. Box 553
Carlisle, MA 01741
Tel: (978) 371-3218
Fax: (978) 371-3219
john@gorecki.us